

## CLAIMS

1. A biochemical reaction apparatus using a biochemical reaction substrate, the apparatus comprising:

a means for holding a substrate having a reaction area for biochemical reaction and an electrode formed in the reaction area;

an external electrode disposed opposite to the electrode of the substrate; and

an electric field controlling means for generating an electric field between the electrode of the substrate and external electrode.

2. The apparatus according to claim 1, wherein:

the electrode of the substrate is a conductive layer formed as an underlying layer of the reaction area; and

the external electrode has a plane parallel to the conductive layer.

3. The apparatus according to claim 1, wherein the electric field controlling means generates an AC electric field between the substrate electrode and external electrode.

4. The apparatus according to claim 1, wherein the electrode is formed like a probe.

5. The apparatus according to claim 1, wherein the electrode is formed from a semiconductor having acceptor or donor ions doped therein.

6. A biochemical reaction substrate used for biochemical reaction, the substrate comprising:

a reaction area for biochemical reaction; and

an electrode for generating an electric field between itself and an external electrode for the electric field to be formed inside the reaction area.

7. The biochemical reaction substrate according to claim 6, wherein:

the biochemical reaction is a hybridization reaction of a nucleotide chain;

the reaction area has a surface coat internally processed for the nucleotide chain to be fixable thereon; and

the electrode is a conductive layer formed as an underlying layer of the surface coat.

8. The biochemical reaction substrate according to claim 7, wherein the conductive layer is formed in the well as an underlying layer of the well so that the electric field generated between itself and external electrode is formed almost perpendicularly to the surface coat.

9. The biochemical reaction substrate according to claim 7, wherein the conductive layer forms an electric field between itself and an electrode disposed in a position opposite to the surface coat.

10. The biochemical reaction substrate according to claim 6, wherein the substrate is disc-shaped and has reading control information recorded therein.

11. The biochemical reaction substrate according to claim 7, wherein the conductive layer is light-transparent.

12. A method of producing a hybridization substrate, the method comprising the steps of:

forming, on the flat surface of a substrate, a plurality of wells each modified at the bottom thereof with a first functional group;

dripping, into each well, a solution containing a nucleotide chain modified at one end thereof with a second functional group that combines with the first functional group; and

combining the first function group with the second functional group while applying an AC electric field perpendicular to the flat substrate to combine the nucleotide chain with the bottom of the well.

13. The method according to claim 12, wherein:

the flat substrate has formed as an underlying layer of the well an electrode layer formed from an electrically conductive material; and

an external electrode is provided near the substrate surface to apply an AC power to between the external electrode and electrode layer in order to apply an AC electric field perpendicularly to the flat substrate.

14. The method according to claim 12, wherein the external electrode is formed from a semiconductor having acceptor or donor ions doped therein.

15. A hybridizing method comprising the steps of:

dripping a solution containing a sample-use nucleotide chain into a well formed on the surface of a flat substrate and having one end of a probe-use nucleotide chain combined with the bottom thereof; and

hybridizing the probe-use nucleotide chain and sample-use nucleotide chain

while applying an AC electric field perpendicularly to the flat substrate.

16. The method according to claim 15, wherein:

the flat substrate has formed as an underlying layer of the well an electrode layer formed from an electrically conductive material; and

an external electrode is provided near the substrate surface to apply an AC power to between the external electrode and electrode layer in order to apply an AC electric field perpendicularly to the flat substrate.

17. The method according to claim 15, wherein the external electrode is formed from a semiconductor having acceptor or donor ions doped therein.